



# Aerodynamics for Naval Aviators



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**Naval Air Systems Command,  
United States Navy**

*Aerodynamics for Naval Aviators*

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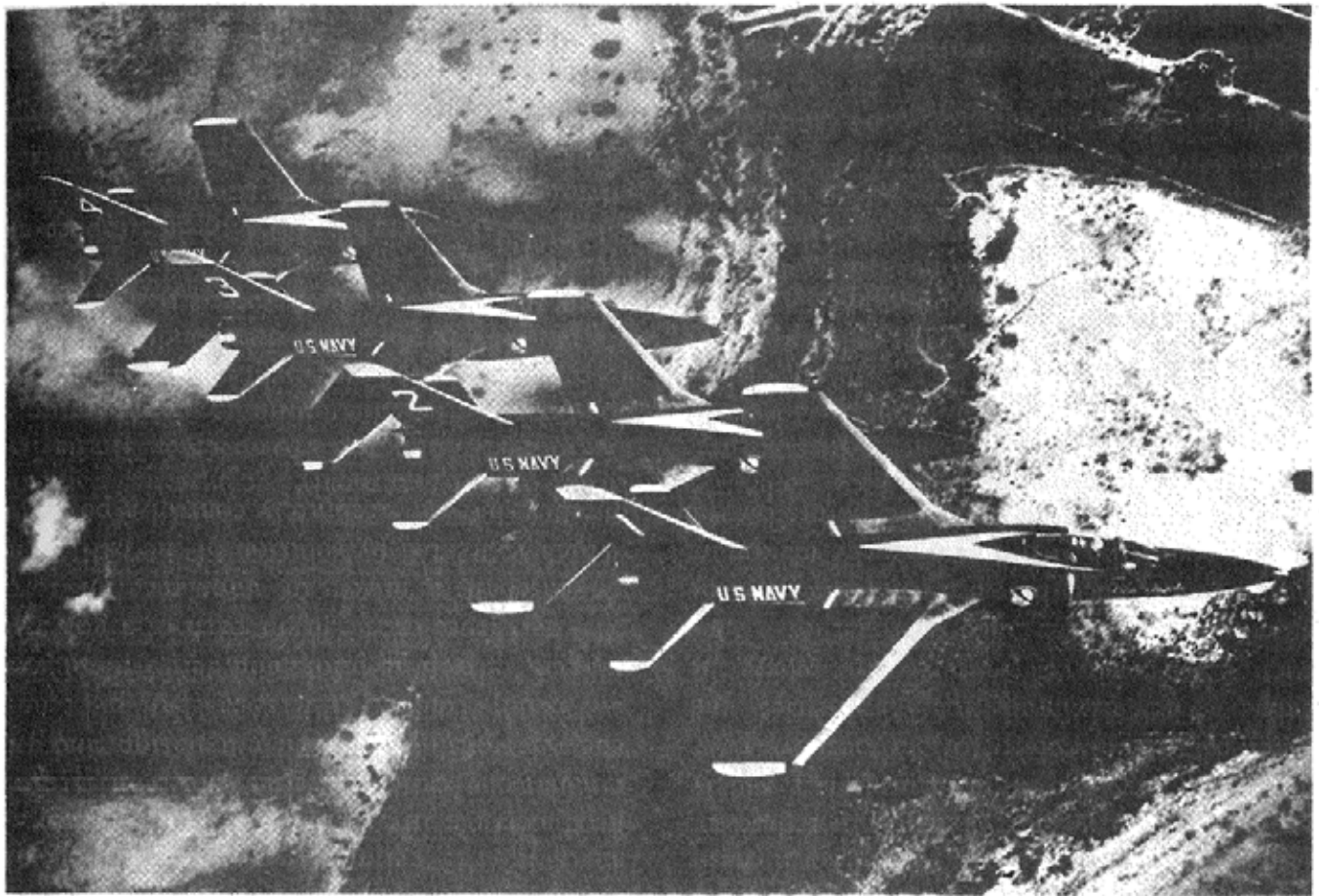
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## Chapter 1

# BASIC AERODYNAMICS

In order to understand the characteristics of his aircraft and develop precision flying techniques, the Naval Aviator must be familiar with the fundamentals of aerodynamics. There are certain physical laws which describe the behavior of airflow and define the various aerodynamic forces and moments acting on a surface. These principles of aerodynamics provide the foundations for good, precise flying techniques.

## WING AND AIRFOIL FORCES

### PROPERTIES OF THE ATMOSPHERE

The aerodynamic forces and moments acting on a surface are due in great part to the properties of the air mass in which the surface is operating. The composition of the earth's atmosphere by volume is approximately 78 percent nitrogen, 21 percent oxygen, and 1

# Aerodynamics for Naval Aviators

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**Naval Air Systems Command  
United States Navy**

*Aerodynamics for Naval Aviators* is the traditional text for Navy pilots and is used as well by the United States Air Force. For more than 50 years, this book has been and remains the pilot's definitive source on aerodynamic and engineering theory as they apply to flight operations.

This book effectively communicates the complexities of applied aerodynamics and aeronautical engineering for both the beginner and the experienced pilot. Flight safety and effectiveness depends greatly on the understanding and appreciation of how and why an airplane flies. Learning aerodynamic principles provides the foundation for developing precise flying techniques and operational procedures.

The information in *Aerodynamics for Naval Aviators* is applicable to flight training, transition training, reciprocating and turbine-powered airplanes, and general flying operations. It is written to provide the elements of both theory and application, covering basic aerodynamics, airplane performance, high speed aerodynamics, stability and control, operating strength limitations, and the application of aerodynamics to specific problems of flying, such as the region of reversed command, wind shear, effects of ice and frost, ground effect, and collision avoidance. More than 500 charts, illustrations, and diagrams aid in understanding; also includes an index and list of selected references.

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